PERFORMANCE BASED SERVICE ACQUISTION (PBSA):

A DYNAMIC LOOK AT PBSA IN THE AIR FORCE

THESIS

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Abstract

Federal procurement has typically focused much of its efforts on the acquisition of products, with acquisition of services not being held in as high of regard. However, recent changes have required the Department of Defense and the US Air Force (USAF) to increase spending on services. This significant increase in spending on services suggests a need to ensure acquisition professionals are prepared to apply sound business judgment to Performance Based Service Acquisition (PBSA) strategies. PBSA involves acquisition strategies, methods, and techniques that describe and communicate measurable outcomes rather than direct performance processes. The Secretary of Defense, in order to ensure the success of PBSA, has established a goal of 50% of all service acquisitions meet PBSA requirements by 2005.

This thesis looks the current status of PBSA with the USAF, if goals are being met, are there any trends to suggest future usage of PBSA, and what factors, if any, are related to whether a contract is classified as having been awarded using PBSA strategies. A combination of demographics, nominal logistical regression, and contingency tables will used in order to determine if the USAF is in compliance and if there are correlations within PBSA that affect its use. The results of this thesis will serve as a starting point from which further research can develop and provide information that can help utilize PBSA in the future.

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Fred J. Lacey IV

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PERFORMANCE BASED SERVICE ACQUISTION (PBSA):

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I. Introduction

Overview

> The Department of Defense is increasingly relying on the acquisition of services to meet its mission needs. Over the last couple of years, we have made some important strides in improving the quality of our acquisition of services. We have new policy regarding performance based service acquisitions requiring that 50% of all service acquisition must meet the Performance Based Services Acquisition standards by 2005. … Yet we have not achieved the level of excellence and consistency that is essential. (Oliver, 2001)

Background

Federal procurement has typically focused much of its efforts on the acquisition of products, with acquisition of services not being held in as high of regard. In January of 2001, Dr. Gansler, then Under Secretary of Defense for Acquisition, Technology, and Logistics, signed the Guidebook for Performance Based Service Acquisition (PBSA) in the Department of Defense (DoD). This guidebook was necessitated by the large increase in Department of Defense procurement of services, $39.9B to $51.8B, from 1992-1999. In 1999, services equaled the total dollars spent on supplies and systems (Gansler, 2001).

PBSA involves acquisition strategies, methods, and techniques that describe and communicate measurable outcomes rather than direct performance processes. It is

structured around defining a service requirement in terms of performance objectives and providing contractors the latitude to determine how to meet those objectives. Simply put, PBSA is a method for specifying what is required and then placing the responsibility or burden for how it is accomplished on the contractor. (Gansler, 2000)

The Federal Government has emphasized the importance of PBSA in a stream of direction dating from early 1991, when the Office of Federal Procurement Policy (OFPP) signed Policy Letter 91-2 to institute a service contracting policy that emphasized the use of performance requirements and quality standards (OFPP, 1991). Subsequent emphasis included direction from the Under Secretary of Defense for Acquisition, Technology, and Logistics that mandated the use of PBSA "wherever possible" (Gansler, 2000); and inclusion in the President's vision for better Government and as an objective in the Procurement Executives Council's 2001-2005 Strategic Plan. DoD's goal is to increase the use of PBSA to acquire best value services with the objective of attaining a minimum of 50 percent of eligible service dollars awarded as PBSAs by Fiscal Year 2005 (Gansler, 2000).

With increasing dollar amounts being spent on service related items, it is imperative that the objectives for PBSA be understood. The Guidebook for Performance-Based Service Acquisition (2001) lists five objectives:

1. Maximize Performance. This objective allows a contractor to deliver the required service by following its own best practices. The focus is the end result; contractors can adjust their processes through the life of the contract, without the burden of contract modifications, provided that the delivered

service remains in accordance with the contract. Incentives can further motivate contractors to furnish greater results.

2. Maximize Competition and Innovation. This objective encourages innovation from suppliers, since government-directed solutions are no longer mandated. In order to maximize competitive alternatives, performance requirements are used instead, increasing innovation and attracting a broader industry base.
3. Encourage and Promote the Use of Commercial Services. Use of procedures from the Federal Acquisition Regulation (FAR) Part 12 (Acquisition of Commercial Items) minimizes the reporting burden and reduces the use of government-unique contract clauses and similar requirements. The use of commercial services offers the additional anticipated benefit of attracting a broader industry base.
4. Shift in Risk. This objective shifts acquisition risks from the Government to industry. Contractors are responsible for achieving objectives in the statement of work through use of their own best practices. Agencies should consider this shift in risk in determining the appropriate acquisition incentives.
5. Achieve Savings. Experiences in both industry and government have demonstrated that use of performance requirements result in cost savings.

Research Objective

The purpose of this thesis is to understand possible influences for the decision to use PBSA strategies on a specific acquisition. The study will investigate possible correlations between whether a contract is classified as having been awarded using PBSA

strategies and such key factors as type of services, dollar amount, length of contract, business size, and contract type. Since Dr. Gansler's (2001) direction to use PBSA "wherever possible" is, at the time of this study only a few years old, there has been little time for this issue to be addressed within the acquisition community. This exploratory study will serve as a starting point from which further research can develop. This study will focus on contracts awarded within the USAF, and specifically within Air Force Material Command (AFMC). The data from AFMC represents approximately 60% of the US Air Force's budget, represents a large sample of USAF obligations, and is readily obtainable.

Thesis Structure

The remainder of the thesis is organized as follows: Chapter 2 will provide a review of the relevant literature, including a discussion of PBSA within the DoD. Chapter 3 will focus on the research methodology aspects to be employed in conducting this research effort. Chapter 4 will provide data analysis and results. Finally, Chapter 5 will provide conclusions and recommendations for further research.

II. Literature Review

This chapter describes the literature relevant to Performance Based Service Acquisition (PBSA) within the Federal Government, the Department of Defense (DoD), the US Air Force (USAF), and the objectives that are established for PBSAs. The chapter will include basic definitions, a description of law and public policies, a synopsis of regulations, DoD and USAF guidance, and previous research and findings conducted by the RAND corporation regarding PBSA. Finally, the chapter concludes with a discussion of current transition of the Federal Government and the DoD to PBSA and some issues related to this transition.

Definitions, Law, Public Policies, and Federal Regulations

The key to understanding PBSA lies within the definitions, laws, public policies, and regulations that build this arena. A brief history of some of the key acts, policies, and regulations that have influenced PBSA over the years illustrates the transformation from traditional services contracting to PBSA and the transformation's impact on the entire procurement process.

PBSA involves an acquisition that is centered telling the contractor what the Government requires, without telling them how to do it (Gansler, 2000). Federal Acquisition Regulation (FAR) Part 37 provides general guidance for the acquisition and management of services by contract. FAR Part 37 requires the use of PBSA to the

maximum extent possible and lays out policies and procedure to support this goal. FAR Part 37.101 defines a "service contract" as:

> … a contract that directly engages the time and effort of a contractor whose primary purpose is to perform an identifiable task rather than to furnish an end item of supply. … Some of the areas in which service contracts are found include the following:
> (1) Maintenance, overhaul, repair, servicing, rehabilitation, salvage, modernization, or modification of supplies, systems, or equipment.
> (2) Routine recurring maintenance of real property.
> (3) Housekeeping and base services.
> (4) Advisory and assistance services.
> (5) Operation of Government-owned equipment facilities, and systems.
> (6) Communications services.
> (7) Architect-Engineering.
> (8) Transportation and related services.
> (9) Research and development.

FAR Part 37.102 excludes the use of Architect & Engineering services, construction, utility services, and services that are incidental to supply purchases as PBSA. It is important to note that FAR Part 37 indicates that when there are inconsistencies or conflicts between Part 37 and other sections of the FAR, specifically Parts 35 (R&D Contracting), 36 (Construction and Architect & Engineering), 39 (Information and Technology), and 47 (Transportation), that Part 37 is superseded by the conflicting FAR part. Despite this attempt at clarification, problems can still arise from unintentional vagueness or inconsistencies among FAR parts. (FAR Part 37)

FAR Part 37.6 specifically prescribes the policies and procedures for the use of PBSAs. This section specifies the requirements for language within the contract and how the Statement of Work (SOW) is to be written, and promotes the use of performance incentives. Further, while it does not limit PBSAs to specific type of contract, FAR Part

37.6 does promote the use of fixed-price type contracts as being appropriate for services that can be defined objectively (FAR Part 37).

Public Law 93-400 established the Office of Federal Procurement Policy (OFPP) in 1974 with the intent of having one office promulgating Government-wide procurement policy (Public Law 93-400, 1974). The first policy to affect PBSA was issued in 1991. Policy Letter 91-2, issued to the Heads of Executive Agencies and Departments of Government, emphasized the use of performance requirements and quality standards in defining contract requirements, source selections, and quality assurance for the acquisition of services (OFPP, 1991).

OFPP Policy Letter 92-1 on inherently Governmental Functions establishes policy relating to service contracting and inherently governmental functions. Its purpose is to assist Federal Departments and agencies in avoiding an unacceptable transfer of official responsibility to Government contractors. Contractors, when properly used, provide a wide variety of useful services that play an important part in helping agencies to accomplish their missions. Agencies use service contracts to acquire special knowledge and skill not available in the Government, to obtain cost effect services, or to obtain temporary or intermittent services. Contractors may not, however, perform all functions. It is clear that certain functions such as infantry and combat troops are inherently Governmental and may not be contracted. On the other hand, it is also clear that certain functions such as building maintenance, food services operations, and secretarial services are not inherently Governmental and may be contracted. The difficulty is in determining which services are or are not inherently Governmental. (OFPP, 1992)

The last of these key OFPP Policy letters, Policy Letter 93-1, established Government-wide policy, assigned responsibilities, and provided guiding principles for Executive Departments and agencies in managing the acquisition and use of services. This policy letter provides agencies with a more results-oriented approach to managing and administering service contracts through the "best practices" concept. (OFPP, 1994)

The OFPP policy letters discussed were enacted in order to clarify and standardize service contracting practices. All three policy letters build towards the requirements that are laid out in the premise of PBSA. OFPP Policy Letter 91-2 is the basic layout to a service contract, while OFPP Policy Letter 91-2 begins to define service contracts that are and are not acceptable (OFPP, 1991; OFPP, 1992). Tying in OFPP Policy Letter 93-1 and the use of best practices, along with the previous two policy letters, we can begin to see the basic structure, basis, and guidance leading to PBSA (OFPP, 1994).

Public Law 103-226, the Federal Workforce Restructuring Act of 1994, came into effect because of the downsizing initiative of the Federal workforce in the early 1990s. Public perception was that agencies were replacing lost employees with service contract workers. The Federal Workforce Restructuring Act prohibits the use of service contracting to compensate for downsizing, unless contracted services provide the government a demonstrable cost benefit (National Performance Review Report, 1996).

The National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2002, Public Law 107-107, Section 801-803 is the first documentation by law to require that the DoD meet the 50% requirement of PBSA of services by FY 2005 (Aldridge, 2002). Section 801 of the NDAA for FY 2002, covers management of the procurement of services and provides basic definitions. More importantly, it includes the requirement for

data collection, including: service purchased, total dollars, type of contract, business size, and the extent of competition (NDAA, 2002). This lays the ground work for future analysis to detect trends that could develop within PBSA.

Section 802 of the NDAA establishes performance goals by fiscal year for PBSA both on a competitive basis and by firm-fixed price (FFP) type contract. Section 802 requires not less then 40% of contracts be competed for FY 2003, 50% for FY 2004, and 75% by FY 2011. For FFP type contracts, Section 802 requires not less then 25% of contracts are FFP for FY 2003, 35% for FY 2004, 50% for FY 2005, and 70% by FY 2011 (NDAA, 2002). Performance against these goals must be analyzed starting with FY 2003 and through FY 2011. Finally, Section 803 discusses the use of competition in all multiple award contracts above $100,000 (NDAA, 2002). Again we can see the emphasis that is being placed on competition.

Though the OFPP had not added any significant policy since 1994 regarding service type contracts, the OFPP asserted itself in March 2003 with the establishment of an Interagency Task Force on PBSA. The idea behind the task force was to reinvigorate the use of PBSA and capitalize on the competitiveness and innovation that occurs when contractors are given the freedom to utilize best business practices and solutions to meet the government's needs. The results from the task force are not designed to show effectiveness of PBSA, but will able to be used as a gauge as to whether PBSA is a priority within differing agencies (Styles, 2003).

The Interagency Task Force on PBSA published its results in July, 2003. The group focused on making recommendations for modifying the FAR in order to promote flexibility for the use of PBSAs, modifications for reporting PBSA, and improving the

availability of guidance. While the task force made several recommendations to support the key areas listed, it also added an additional discussion on cost savings. Specifically, the task force suggests that it is possible for cost savings to occur by utilizing PBSA. However, they warn that there is little data to support any assertion of savings and that if the data were available and sufficient, it would be difficult to isolate the reason behind the savings. (Interagency Task Force, 2003)

PBSA definitions, laws, public policies, and regulations which build the framework for the situation around what the Federal Government must contend with. However, there are additional requirements that build upon PBSA requirements when looking at the DoD and USAF. We will now look at the key policies and guidance that shape the DoD and USAF's view on PBSA.

DoD and USAF Guidance

Air Force Instruction (AFI) 63-124 was released into the USAF acquisition community on 1 April, 1999. The intent of AFI 63-124 was to replace previous policy for service contracts, under Air Force Manual 64-108, in an effort to promote PBSA throughout the USAF. AFI 63-124 defined four criteria (in accordance with FAR PART 37.6) that must be met:

(1) Describe requirements in terms of results required rather than the methods of performance of the work.
(2) Use the measurable performance standards and quality assurance surveillance plans.
(3) Specify procedures for reduction of fee or reduction to price of a fixed-price contract when services are not performed or do not meet contract requirements.
(4) Include performance incentives when appropriate.

AFI 63-124 defined key rolls and responsibilities within PBSA; defined the establishment for support and working teams; and sets forth requirements for the SOW, performance measures, and quality assurance. It also listed services that are exempt from falling under PBSA, in addition to those listed under FAR Part 37.102. (AFI 63-124, 1999)

Effective 9 February 2004, the USAF issued an Interim Change to AFI 63-124. The largest change was the withdrawal of services exempt from PBSA under AFI 63-124. This allowed for all services contracts over the Simplified Acquisition Threshold (SAT), currently listed at $100,000 per year, to be eligible for PBSA (IC2004-1, 2004). Note, the SAT is a dollar limitation that has been set the Federal Government, in which simplified acquisition procedures can be used in order to reduce costs, promote efficiency, and avoid unnecessary burden (FAR Part 13). Only those services still listed under FAR Part 37.102 remain exempt from PBSA (IC2004-1, 2004). This change will significantly influence achieving the goal of 50% PBSA by FY 2005.

In an effort meet the requirements set by Dr. Gansler in April 2000, the USAF issued its own PBSA Implementation Plan in June 2000 (Gansler, 2000). The plan laid out guidance for types of services that would be acquired under PBSA including: maintenance, repair, operations and support, modifications, modernization, and medical services. Service not covered by the plan included Research and Development (R&D), most Advisory and Assistance Services (A&AS), and items excluded within Attachment 2 of AFI 63-124, such as utilities, Architect & Engineering, and services incidental to supply purchases (PBSA USAF Implementation Plan, 2000; AFI 63-124, 1999). The justification for excluding R&D and A&AS is due to the type of contract that is typically associated with this type of service, that of a cost reimbursement. Cost type contracts,

while possible to use for PBSA, typically do not define outcomes based on performance or definable goals due to the nature of the work involved and typically poor candidates for PBSA (PBSA USAF Implementation Plan, 2000). The final exclusion category, beyond what has previously been stated, affected those services below the $100,000 threshold, matching that of AFI 63-124, but encouraged the use of PBSA where possible below this threshold. While the USAF has encouraged the use of PBSA since the issuance of AFI 63-124, it's Implementation Plan set fourth the requirement of tracking this progress beginning in Fiscal Year 2001 (PBSA USAF Implementation Plan, 2000).

In order to obtain PBSA strategies and what Dr. Gansler labeled as "best commercial practices," he had the DoD develop the Guidebook for PBSA, which was published in March 2001 (Gansler, 2001). As mentioned previously, the guidebook states objectives that the Under Secretary of Defense would like to obtain. In addition to the objectives, the guidebook provides guidance consistent with FAR and OFPP policy for: market research, development of performance work statements and measurable performance standards, incentives and remedies, contractor performance management, source selection considerations, and contract administration (Guidebook, 2001).

The latest guidance to be handed down through the DoD and USAF is the Management and Oversight of Acquisition of Services Process (MOASP). This guidance was sent out in April 2003 from the USAF Program Executive Office for Services (AFPEO/SV), now the AFPEO for Combat & Mission Support (CM), and primarily provides written guidance to reinforce the requirements and laws mentioned previously. Specifically, the MOASP calls attention to the NDAA for FY 2002, Pub. Law 107-107, Section 801 and DoD Guidebook for PBSA (MOASP, 2003)

Now that we have looked at guidance through the DoD and USAF, Federal policy, and law for PBSA, we have a solid grasp of the conditions and requirements leading to PBSA usage within the USAF. Due to the short amount of time the PBSA has been required by the USAF and Federal Government, little has been accomplished in looking at the current environment and how it is progressing. The next section will give a look at what research has been accomplished and the results that have been found.

Previous Research

Project AIR FORCE. Previous research on PBSA is sketchy; only 3 studies were found. The USAF contracted the RAND Corporation to conduct federally funded studies within the USAF. A division of RAND, Project AIR FORCE, provides independent analyses of combat readiness, policy, and support of aerospace forces (Moore et.al., 2002). From Project AIR FORCE, two studies have specifically focused on PBSA while a third primarily addressed Supply Chain Management but included portions of PBSA within the research. The results were released in the form of documented briefings.

The first of the three studies is titled, "Performance-Based Contracting in the Air Force: A Report on Experiences in the Field." This first look into PBSA within the Air Force studied successful examples of PBSA implementation and to see how to apply them within other areas. The research was conducted on 22 contracts, from volunteer bases that identified their own PBSA contracts as successful. Several key areas were assessed including: training, market research, defining requirements, SOW and quality assurance plans, contract structure (type), source selection procedures, and past performance. (Ausink et.al., 2001)

This study found that 19 out of 22 contracts were firm fixed type contracts and 21 of the 22 contracts were competitively bid with 4 of them awarded under FAR Part 12, Commercial Practices. Additionally, only 6 contracts contained incentive fees. The researchers qualified their findings by stating the analysis was difficult to conduct, and comparisons were hard to draw between old and new contracts, primarily because the scope and SOW for the new contract were different from the previous one. That being said, the research found it difficult to draw any cost comparisons or savings due to the infancy of the PBSA contracts and change in scope and SOW. Recommendations concluded that better guidance be established for PBSA within the USAF and that better data collection would be required in order to determine if changes were making any impact in cost or performance. (Ausink et.al., 2001)

The second study involving PBSA is titled, "Implementing Best Purchasing and Supply Management Practices: Lessons from Innovative Commercial Firms." While the bulk of the of the research was focused on Purchasing and Supply Management (PSM), the researchers identified that PBSA includes adaptations of best commercial PSM practices and that the USAF considers PBSA as having a more narrow focus then PSM. To this end, interviews were conducted and included gathering information on implementation of PBSA within the USAF. The basic findings showed that while contracting took the lead role in making PBSA a reality, other organizations, such as logistics and civil engineering, took on larger roles as well, in order for PBSA success. Secondary to this finding, is that in order to understand best commercial practices, market research and benchmarking will play key factors. Though this research addressed

implementation of PBSA, no hard numbers were provided as to a status of the increase in PBSA usage. (Moore et.al., 2002)

The final RAND study involving PBSA is titled, "Implementing Performance-Based Service Acquisition (PBSA): Perspectives from an Air Logistics Center and a Product Center." This study determined that systems type contracts had different requirements, which allowed for infrequent opportunities for performance evaluations and/or define a successful outcome for evaluation. The researches noted it was difficult to determine whether adding performance standards improved PBSA use because the use of performance standards had been in use at the ALCs prior to the requirement being formalized in AFI 63-124. (Ausink et.al. 2002)

This research found that many commercial services are ideal for meeting the requirements of AFI 36-124. However, services supporting systems were not as good a fit to the requirements for PBSA; specifically, meeting the second requirement of "measurable performance standards," was extremely difficult. However, the researchers suggested that despite the difficulty, systems contracts can meet the intent of the AFI, even if they do not meet the second criteria. (Ausink et.al., 2002)

While there has been limited research regarding PBSA within the DoD and USAF, research in the civilian community seems to be even less. Services do not take up as much of commercial industries' budgets, as in the Federal Government, with only 5-20% range for the contracting of external services (Barry, 2003). There are some parallels that exist between USAF and the commercial sector in that both baseline requirements (SOW), provide incentives, and develop performance measures (Barry, 2003; AFI 63-124). While it is possible for the Federal Government, the DoD, or the

USAF to obtain the goal of 50% of all services to be PBSA by the year 2005, industry has not pushed PBSA to this level.

Transition to PBSA

As shown in the literature, there are only a few studies that have been accomplished regarding PBSA and specifically looking at the USAF. Key elements regarding the type of contract used, business size, solicitation procedures and competition requirements, and the use of commercial practices have all been addressed, but not on an in-depth basis. (Ausink et.al., 2001; Ausink et.al., 2002)

Conclusion

This chapter described the relevant literature within the Federal Government, DoD, the USAF, and the objectives that are established for PBSAs. Basic definitions, a description of law and public policies, a synopsis of regulations, DoD and USAF guidance, and previous research and findings conducted by the RAND corporation regarding PBSA where addressed. The chapter concluded with a discussion of current transition of Federal Government and DoD to PBSA and some issues that are revolving around this transition. These areas were brought together into developing the research objective. Chapter 3 discusses the methodology used in testing the research objective and the data obtained.

III. Methodology

The purpose of this chapter is to explain the research methods that were used to explore the possible influences into Performance Based Service Acquisition (PBSA) strategies. This effort takes data provided by Air Force Materiel Command (AFMC) and looks at the current status of PBSA within AFMC as a representation of the overall US Air Force (USAF) PBSA effort. The data was obtained from the Department of Defense's (DoD's) procurement data collection (DD350), which feeds this information into the Federal Procurement Database System (FPDS).

It is the intent of this study to produce demographics in order to represent current situation regarding PBSA within AFMC as a representative population of USAF efforts. Additional exploration through logistical regression analysis will be conducted in order to determine if there is any correlation between certain factors within a contract and whether an contract action is classified as PBSA or not. Finally, contingency table analysis will determine if there is dependency between elements of a contract and whether it is classified as PBSA or not. The primary goal of this research is to provide a representation of the status of PBSA implementation within the USAF and whether established goals for PBSA implementation will be met. Analysis will identify any additional factors correlated with PBSA implementation, in order to help predict future PBSA actions and areas that can possibly be improved upon.

This chapter includes the research problem, research design, the instruments used to gather data and the reliability of that data, data analysis, and concludes with a summary.

Research Problem

PBSA is a service acquisition tool that has been formally utilized within the USAF since the inception of Air Force Instruction (AFI) 63-124, on 1 April, 1999 (AFI 63-124, 1999). Dr. Gansler formally set a goal of 50% of all service contracts within the DoD, which includes the USAF, to be PBSAs by Fiscal Year (FY) 2005 (Gansler, 2000). The National Defense Authorization Act (NDAA) for FY 2002 set this goal and interim goals for PBSAs, into public law (NDAA, 2002). Since this time, very little research has been performed regarding PBSA and the research that has been conducted, has had limited results in its findings.

Because of the limited research to date, this exploratory study will address the following research question: What is the status of PBSA implementation in the US Air Force (USAF)? Several investigative questions were developed in order to answer the research question:

1. Are the goals, as established by Dr. Gansler and NDAA, being met by AFMC and the USAF, and are there any trends to suggest future usage of PBSA?
2. What factors, if any, are related to whether a contract is classified as having been awarded using PBSA strategies?

In order to answer the research/investigative questions listed above, there will be three primary elements involved; demographics, nominal logistical regression, and contingency tables. To address this research problem, the following research design was developed.

Research Design

The research design selected for this study was a combination involving exploratory and causal-comparative design. This design was selected to address the focused nature of this topic, the effects that particular areas within a contract interact with one another, and the relatively small amount of research that has been conducted in this area. Virtually all previous studies relating to PBSA were conducted using inductive research and qualitative methods. Inductive reasoning involves making generalized conclusions about a population being studied, while qualitative is defined as data that can not be divided or measured discretely, usually in the form of verbal comments or field notes (Leedy and Ormrod, 2001; McClave et.al., 2001). This leads to the ability to draw generalized conclusions, but is difficult to validate the results in concrete terms.

This study will explore PBSA from a different perspective, one that is more quantitative in nature. Quantitative data is defined as data that can be divided into discrete, measurable variables that are numerically represented, such as money, distance, or weight (Leedy and Ormrod, 2001). The literature review has pointed to key variables within PBSA, such as type of service, dollar amount business size, and the contract type. It is the hope that these key elements will lead to correlations within PBSA, but there has been no research to date to analyze this. This has led to the need for research that, while exploratory, either confirms or disconfirms these correlations without preconceived conceptions to the possible findings and that can be used as a starting platform for future research.

The causal-comparative design provides a means by which we can examine how specific independent variables affect the dependent variable of interests. It allows a

backward look in time, with the intent of trying to determine possible relationships or correlations, and attempts to explain why it occurred. Causal-comparative design is not able to determine cause and effect since a researcher does not have control over the data as it is produced (Leedy and Ormrod, 2001). In this situation, causal-comparative design will allow us to see if there are any correlations, dependencies, or relationships between whether a contract action is classified as PBSA or not, compared to other aspects within a contract action.

Data Gathering and Reliability

For purposes of this research, data gathered through the DD350 system will be utilized. The DD350 system gathers individual contracting action reports, for all contract actions classified over $25,000, and the information is sent for Congressional review (DFAR 253.204, 2003). The information gathered through the DD350 system is the first level of input from a contract action and is considered primary data. Primary data is defined as data that is closest to the primary source of information or closest to the truth (Leedy and Ormrod, 2001). Data of this nature is considered to be some of the most reliable and valid data that can be collected and utilized for research (Leedy and Ormrod, 2001).

However, no data collection system is without faults. In two different reports from the General Accounting Office (GAO) data collected by the DD350 was found to have several limitations. These limitations include: reporting levels that exclude millions of dollars in procurement obligations; obligation of funds versus actual expenditures; lack of data for subcontracts; and recorded data differing from actual data (GAO, 1998; GAO;

2003). Despite these limitations, the DD350 database represents the greatest collection of possible data available and despite the systems imperfections, it represents a more reliable system of gathering data than this researcher would be able to develop.

Given the short time frame that the USAF has used PBSA there is limited data on this subject. The data available in the DD350 system includes all service contract actions for FY 2002 for the AFMC and all service contract actions for FY 2003 for the USAF. The data for FY 2002 and FY 2003, will be utilized in the demographic portion of this research, while the data for FY 2002 and the AFMC portion of data for FY 2003, specifically that pertaining to AFMC, will be utilized for logistical regression and contingency tables. Rationale for this approach is provided in the next section.

Data Analysis

Three different means in which to analyze that data have been chosen for this research. This section will describe each methodology and why it was chosen.

Demographics. Simple demographics will be used to answer investigative question 1, that is, to determine if the USAF is meeting the goal established for FY 2003, twenty-five percent of all service contract actions and dollars awarded as PBSA (NDAA, 2002). Demographics also provides a starting point for analyzing the data and determining if there are any initial trends that will lead to further testing in this research.

Utilizing the DD350 database for AFMC and the USAF, for FY 2002 and FY 2003, demographics will be used to see if there are any trends that are developing with regards to PBSA. This analysis will include overall actions and dollars for PBSA, type of contracts utilized, size of business award to, and percentage of competed PBSA contracts.

Besides any initial trends and predominate factors that are identified, the use of demographics will ultimately answer if the goals for PBSA are being achieved. While demographics will answer basic questions, it will not answer complex correlations or predictive capabilities.

Nominal Logistical Regression. Nominal logistical regression will be used to answer investigative question 2. The data being utilized for this particular section is strictly the data that pertains to AFMC. Since the data available does not include all data points for the USAF for FY 2002, it not possible to run regression of FY 2002 and full database of FY 2003, and make a logical comparisons. The data between the two databases would skew the results and findings would not be relevant. However, by the utilizing a portion of the data from the FY 2003 database, specifically that of AFMC, a regression model can be run across two consecutive years of data. AFMC represents the predominant amount of contract actions and dollars spent across the USAF, approximately 60%. The represents a good sample size, with sufficient data points, in order to draw conclusions (Leedy and Ormrod, 2001).

The data in this analysis is both quantitative and qualitative/nominal in nature. Quantitative data is defined as data that can be divided into discrete, measurable variables that are numerically represented, such as money, distance, or weight (Leedy and Ormrod, 2001). Conversely, qualitative/nominal data is defined as data that can not be divided or measured discretely, usual in the form of verbal comments or field notes, but can be assigned a discrete value with no implicit order (Leedy and Ormrod, 2001; McClave et.al., 2001). In this situation, the dependent variable is a yes or no response as to whether or not a contract action is PBSA. Since yes and no are verbal responses, they are

qualitative in nature, however they can be described in nominal form, such as 0 and 1 (Leedy and Ormrod, 2001; McClave et.al., 2001). Many of the variables within the data set that the research will be analyzing are qualitative/nominal or multi-nominal, responses resulting in numerical assignment of 0, 1, 2, 3,…, to the nth number (McClave et.al., 2001).

When the response variable or dependent variable is nominal, we must fit the probabilities that the response is one of *r* different response levels given by the data values. The basic model is that for each observation:

Probability (Y = j^{th} response level) = some function of the X and parameters

The simplest model for a nominal response in which the probability (p) that y, the dependent variable, is response level j is estimated by dividing the total sample count n into the total of each response level n_j, and is written:

$p_j = n_j/n$

All other models are compared to this base model. The base model serves the same role for a nominal response as the sample mean does for continuous models. (McClave et.al., 2001)

The R^2 (U) measures the portion of the uncertainty accounted for by the model and is calculated by taking the explained sample variability divided by the total sample variability, represented as follows:

R^2 (U) = Explained sample variability/Total sample variability

In other words, this will explain the total sample variability that is explained by the relationship between the dependent and independent variable(s). An R^2 (U) of 1 means that the factors completely predict the categorical response. An R^2 (U) of 0 means that

there is no predictive capability. In categorical data analysis, high R^2 values are somewhat rare. (McClave et.al., 2001)

Contingency Tables. As a secondary check of this information and the nominal logistical regression process, contingency tables have been chosen. A contingency table is a statistical model used for multi-nominal data and provides a determination of dependence (McClave et.al., 2001). Contingency table analysis provides an observed count of the occurrence, an expected count, probability for each cell, row, and column, and the probability chi-square (X^2) for determination of dependence. See Table 1 for an example of a contingency table. This will allow for a comparison to the findings of nominal logistical regression, identification of additional correlations, or in the event that no relationships have been found through previous methods, another means of analyzing the data. This approach is attempting to help answer investigative question 2 of this research.

Like that of nominal logistical regression, the data that will be used for this section of research includes the AFMC database for FY 2002 and FY 2003. Utilizing this database with contingency tables is a secondary method of determining if there are correlations between factors (also known as classifications for contingency tables) within PBSA.

Table 1. Sample Contingency Table

		Dependent Variable Y				
		1	2	3	4	Totals
Independent Variable X	1	n_{11} p_{11}	n_{12} p_{12}	n_{13} p_{13}	n_{14} p_{14}	r_1 p_{r1}
	2	n_{21} p_{21}	n_{22} p_{22}	n_{23} p_{23}	n_{24} p_{24}	r_2 p_{r2}
	3	n_{31} p_{31}	n_{32} p_{32}	n_{33} p_{33}	n_{34} p_{34}	r_3 p_{r3}
	Totals	c_1 p_{c1}	c_2 p_{c2}	c_3 p_{c3}	c_4 p_{c4}	n 1

In this table, n represents the count for each column and row. For instance, n_{12} represents the cell count for column 2, row 1. r and c represent row and column respectively, while p represents the probability for each cell, row, or column. This information not only will give a general breakout of the data, but also can identify whether there are anomalies, utilizing expected and actual counts, across each individual cell. In addition to this, chi-square (X^2) will be determined for the entire contingency table. X^2 is the sampling distribution taken from the comparison of the sample variance to the hypothesized value of the sample variance. From obtaining X^2, we can determine if two items or classifications within PBSA are dependent. Dependency will provide insight as to whether classifications within PBSA can be predictive of each other. In other words, if we know two classifications are dependent, by knowing one of those factors we should have a clue or insight as to what the other factor will be. (McClave et.al., 2001)

In order to determine dependency across two classifications, we establish or start from a reference point that classifications are independent of each other. This will be our

null hypothesis (H_O). Our alternate hypothesis (H_a) will therefore be that the two classifications are dependent. In order to determine if we accept or reject the null hypothesis we must determine the X^2 for the contingency table, by using expected values ($\hat{E}$) for each cell count. The following equations are based off Table 1 as a sample:

$$\hat{E}(n_{11}) = n(r_1/n)(\, c_1/n) = r_1c_1/n$$

This is accomplished for each cell:

$$\hat{E}(n_{12}) = r_1c_2/n$$

$$\vdots \qquad\qquad \vdots$$

$$\hat{E}(n_{34}) = r_3c_4/n$$

Once the information is tabulated, data cells that have an expected value of 5 or less must be removed, as they will cause inconsistencies within the table, due to the low expected number. (McClave et.al., 2001)

X^2 is now determined through the following equation:

$$X^2 = [n_{11} - \hat{E}(n_{11})]^2/\hat{E}(n_{11}) + [n_{12} - \hat{E}(n_{12})]^2/\hat{E}(n_{12}) + \ldots + [n_{34} - \hat{E}(n_{34})]^2/\hat{E}(n_{34})$$

In order to determine X^2 for each contingency table, the above equation compares the observed and expected counts in each cell of the contingency table. Then the sum of each cell is taken in order to determine X^2. Once we have determined X^2, we must determine our chi-square alpha (X^2_α). Alpha (α) is the significance level, usually 0.05, and implies willingness to accept that 5% (alpha) of the time a significant difference will be incorrectly declared. In order to determine X^2_α , we must find the degrees of freedom (df), which is the shape of a distribution or contingency table. To find degrees of freedom, we use the following equation:

$$df = (r-1)(c-1)$$

Finally, we use X^2 tables to determine our X^2_{α} based on our degrees of freedom ($X^2_{\alpha\ ,\ df}$). In order to determine if we accept or reject our null hypothesis, we must establish a reject region, represented like this:

Rejection region: $X^2 \rangle X^2_{\alpha\ ,\ df}$

If we have an extremely large X^2, or if X^2 is larger than $X^2_{\alpha\ ,\ df}$, we reject the null hypothesis of independence and assume the alternate hypothesis is correct and that there is dependence between classifications. (McClave et.al., 2001)

There is a final note of caution that must be addressed when using contingency tables. Contingency tables analysis can determine if there is a dependency between two factors or classifications. Contingency tables analysis does not determine the extent of the relationship between the two classifications. This is due to the fact that dependence can be due to a number of factors, not just a relationship between the two classifications. (McClave et.al., 2001)

Validity and Reliability

As in any research, there is a concern as to the validity and reliability of that research. Validity can be defined as the accuracy, meaningfulness, and credibility of a model, where as reliability is the extent to which a measurement instrument yields consistent results. This section will look at construct, internal, and external validity, as well as the reliability of the research being presented. (Leedy and Ormrod, 2001)

Construct validity is the extent to which an instrument measures a characteristic that cannot be directly observed but must instead be inferred. In this situation, there are no inferences by the DD350 system to collect data and it is indifferent to this aspect by

strictly focusing on the collection of data in relationship to the contract action. Inference of outside effects to the data are minimized by the use of regression models, such as nominal logistical regression and contingency tables and are solely based on the data provided. By utilizing these methods, the data can be viewed in an unbiased manner and minimize this risk of outside influence. (Leedy and Ormrod, 2001)

Unfortunately, construct validity is compromised due to the means in which the data was gathered. Individuals inputting data, know the data will be viewed at some point and can place bias upon the data based on this perspective. With regards to this research, the data is already gathered and there is no counteraction for this effect. (Leedy and Ormrod, 2001)

The internal validity is the extent to which its design and the data that it yields allow the researcher to draw accurate conclusions about cause-and-effect and other relationships within the data. In order to minimize this risk, the research will use the approach of triangulation. Triangulation is when multiple points of data are collected in the hope that they all converge to support a particular theory, in this case, that there are correlations between differing factors within a contract action. Nominal logistical regression will be used to find, if any, these correlations. (Leedy and Ormrod, 2001)

External validity is the extent to which results apply to situations beyond the study itself. AFMC represents approximately 60% of the USAF dollars spent and actions for service contract actions. This figure suggests that AFMC is a reasonable representation and sample of the overall population. In doing this, we minimize the risk of external validity in that any results from this research should reflect a reasonable assumption with regards to the rest of the USAF. (Leedy and Ormrod, 2001)

Reliability is the extent to which a measurement instrument or data yields consistent results (Leedy and Ormrod, 2001). The use of nominal logistical regression and contingency tables in the research, enhance the reliability. The results these analysis tools provide are consistent and proven methodologies within the scientific community (McClave et.al., 2001).

However, the data that is being utilized does contain issues with regards to its reliability. As previously mentioned, there are several issues that plague the DD350 system, for gathering reliable data. In addition to those, there is a subjective nature regarding the DD350 system when inputting data. Several fields within the DD350, contain choices that are not necessarily identical with the contract action being recorded. This calls for the individual inputting the data, to make a subjective opinion about which field accurately describe the data being gathered (GAO, 1998; GAO; 2003). For instance, when choosing a service code, the individual must choose the best code to match the action. This is a subjective decision by the individual, especially if more then on service is used in a contract action and the code determines the predominant service being performed (GAO, 1998; GAO; 2003).

The subjective nature of these inputs can cause possible discrepancies within the data that can cause outcomes from the research to be inaccurate (Leedy and Ormrod, 2001). There is very little that can be done in order to address this issue. The data will be taken at face value and noted as a limitation to this research.

Summary

Chapter 3 discusses the research objective, the associated research, and investigative questions in order to meet this objective. The research design and the nature at which that data has been examined has been discussed. The means at which the data was gathered, the data's validity and reliability, and the pitfalls to the data were addressed. Finally, a discussion of the methodologies that will be used to analyze this data was discussed. Chapter 4 will address the data analysis, findings based from this analysis, and any conclusions that can be drawn from the research accomplished.

IV. Results and Analysis

This chapter provides a summary of the results of the research. The research results are represented in three sections. The first section includes demographic results and addresses investigative question 1. The second section includes nominal logistical regression analysis and conclusions based on investigative question 2. The third section addresses contingency tables and conclusions based on investigative question 2. Appendix 1 provides complete demographic breakouts that are not supplied in this chapter. Appendix 2 and 3 provide supplemental findings of nominal logistical regression and contingency tables not provided in this chapter.

Data Analysis

Research Question. Based on the requirements placed on Performance Based Service Acquisition (PBSA) and the limited research to date, this thesis will serve as an exploratory study in which future research can be based. The research question of this thesis is: What is the status of PBSA implementation in the US Air Force (USAF)? The following investigative questions were developed in order to answer the research question:

1. Are the goals, as established by Dr. Gansler and National Defense Authorization Act (NDAA), being met by Air Force Material Command (AFMC) and the USAF and are there any trends to suggest future usage of PBSA?

2. What factors, if any, are related to whether a contract is classified as having been awarded using PBSA strategies?

Demographics. In order to answer investigative question 1, demographics were utilized to gain a basic insight into the usage of PBSA. A summarized version of these demographics can be found in Tables 2, 3, and 4.

Table 2. Summarized Demographics for AFMC FY 2002

AFMC FY 2002			
Total Number of Actions =	9906	Actions PBSA =	2490
% of Total Actions that are PBSA =	25.04%		
Total Dollars =	$7,044,436,993.00	Total PBSA $ =	$2,213,182,268.00
Total %$ =	31.42%		

Table 3. Summarized Demographics for AFMC FY 2003

AFMC FY 2003			
Total Number of Actions =	20307	Actions PBSA =	2964
% of Total Actions that are PBSA =	14.60%		
Total Dollars =	$16,459,023,441.00	Total PBSA $ =	$2,834,679,428.00
Total %$ =	17.22%		

Table 4. Summarized Demographics for USAF FY 2003

USAF FY 2003			
Total Number of Actions =	35607	Actions PBSA =	10191
% of Total Actions that are PBSA =	28.62%		
Total Dollars =	$27,911,859,775.00	Total PBSA $ =	$8,761,877,311.00
Total %$ =	31.39%		

Looking first at the AFMC data for FY 2002 and FY 2003, we can see that the actions for services, as well as the dollars, have more then doubled between the two years. While AFMC has more then doubled its service acquisitions between the two years, the percentage of actions and dollars being utilized under PBSA has decreased. Between FY 2002 and FY 2003, the number of action AFMC has awarded under PBSA have only increased by 474, a 19% increase, where as the overall number of service actions for AFMC has increased 104%. Dollars for PBSA increased 28% from FY 2002 to FY 2003, while overall service dollars for AFMC increased 133%.

From this initial look across two years, the results for AFMC are discouraging in 2003. AFMC represents approximately 60% of the service actions and dollar expenditures for the USAF. The NDAA for FY 2002 required that 25% of service actions be PBSA for FY 2003 (NDAA, 2002). AFMC FY 2003 fell short of reaching this goal, by 10.4% of its actions and 7.78% of its dollars spent. It should be noted that there is an outlier in the data for one contract action with the value of $1.75B. If this outlier is

removed, AFMC would increase its PBSA usage to 19.5%. This still falls short of established goals.

When looking at the USAF as a whole, a snap shot of current time looks promising. The USAF showed 28.62% of all its service acquisitions are PBSA and that 31.39% of its dollars spent on services are PBSA. This meets the required 25% for FY 2003. From this, two critical points can be ascertained. First, the USAF is meeting and exceeding the requirements lad out for PBSA. Second, if AFMC represents 60% of service actions/dollars spent and is falling short of the established requirements, then the remainder of the USAF must be exceeding the requirements. To be more precise, the remaining 40% of the USAF is awarding service actions at 47.24% and service dollars at a 51.75%. This is a significant amount and comes close to meeting the NDAA requirement for FY 2005 of 50% services must be PBSA (NDAA, 2002).

When looking further into the data and reviewing Chapter 2, it became apparent that there were three probable indicators of PBSA: service code (type of service), contract type, and type of entity (business size). Table 5, 6, and 7 show a summary and key highlighted areas for service codes.

Table 5. Summary of Service Code for AFMC FY 2002

AFMC FY 02 Separated PBSA by Service Code				
Service Code	Service Code Description	% of Actions Yes PBSA by Service Code	% of Dollars Yes PBSA by Service Code	% of Service Code Dollars by Total Service Code Dollars
AZ16	RDTE/Other Research & Development-Mgmt Support	32.52%	90.20%	3.97%
B599	Other Special Studies & Analyses	25.48%	12.28%	5.60%
D306	ADP Systems Analysis Services	18.93%	25.19%	1.25%
D307	Other ADP & Telecommunication Services	1.33%	0.03%	1.19%
D399	Other ADP & Telecommunication Services	37.46%	47.95%	1.89%
J015	Maint & Repair of Eq/Aircraft Structural Comps	6.45%	8.85%	6.06%
J016	Maint & Repair of Eq/Aircraft Comps & Accys	7.50%	1.49%	1.99%
J058	Maint & Repair of Eq/Communication Equipment	16.13%	4.87%	1.10%
J069	Maint & Repair of Eq/Training Aids & Devices	67.23%	51.84%	2.42%
J070	Maint & Repair of Eq/ADP Equip & Supplies	1.65%	0.82%	4.10%
J099	Maint & Repair of Eq/Miscellaneous Equipment	41.01%	31.21%	2.03%
K015	Modification of Eq/Aircraft Structural Comps	9.76%	5.05%	1.64%
K016	Modification of Eq/Aircraft Comps & Accys	0.00%	0.00%	1.33%
K058	Modification of Eq/Communication Equipment	0.00%	0.00%	1.05%
K069	Modification of Eq/Training Aids & Devices	72.97%	54.15%	1.15%
L014	Tech Rep Svcs/Guided Missiles	71.14%	64.02%	12.67%
R414	Systems Engineering Services	23.36%	14.07%	18.62%
R425	Engineering Technical Services	34.77%	39.85%	7.62%
R706	Logistics Support Services	52.34%	86.40%	4.01%
Totals:		25.58%	32.22%	79.69%

Table 6. Summary of Service Code for AFMC FY 2003

AFMC FY 03 Separated PBSA by Service Code				
Service Code	Service Code Description	% of Actions Yes PBSA by Service Code	% of Dollars Yes PBSA by Service Code	% of Service Code Dollars by Total Service Code Dollars
AC14	RDTE/Aircraft-Demo/Valid	0.00%	0.00%	1.67%
AC15	RDTE/Aircraft-Eng/Manuf Develop	0.00%	0.00%	6.36%
AC53	RDTE/Weapons-Adv Tech Dev	0.00%	0.00%	3.65%
AC63	RDTE/Electronics & Communication Eq-Adv Tech Dev	0.00%	0.00%	1.13%
AC65	RDTE/Electronics & Communication Eq-Eng/Manuf Dev	0.00%	0.00%	2.53%
AD92	RDTE/Other Defense-Applied Research	0.17%	0.05%	2.49%
AD93	RDTE/Other Defense-Adv Tech Dev	0.00%	0.00%	1.83%
AZ13	RDTE/Other Research & Development-Adv Tech Dev	0.00%	0.00%	3.53%
AZ14	RDTE/Other Research & Development-Demo/Valid	0.00%	0.00%	1.26%
AZ16	RDTE/Other Research & Development-Mgmt Support	35.88%	92.61%	1.72%
B599	Other Special Studies & Analyses	47.20%	27.56%	3.15%
H216	Equip & Mats Testing/Aircraft Comps & Accys	0.00%	0.00%	10.95%
J015	Maint & Repair of Eq/Aircraft Structural Comps	9.15%	5.73%	3.07%
J016	Maint & Repair of Eq/Aircraft Comps & Accys	3.85%	0.23%	2.37%
J069	Maint & Repair of Eq/Training Aids & Devices	82.79%	88.06%	1.41%
J070	Maint & Repair of Eq/ADP Equip & Supplies	3.20%	0.84%	2.62%
L014	Tech Rep Svcs/Guided Missiles	60.12%	70.47%	5.61%
R414	Systems Engineering Services	25.59%	21.09%	8.38%
R425	Engineering Technical Services	42.60%	31.25%	2.76%
R499	Other Professional Services	24.76%	90.30%	2.27%
Totals:		14.64%	17.40%	76.61%

Table 7. Summary of Service Code for USAF FY 2003

USAF FY 03 Separated PBSA by Service Code				
Service Code	Service Code Description	% of Actions Yes PBSA by Service Code	% of Dollars Yes PBSA by Service Code	% of Service Code Dollars by Total Service Code Dollars
AC15	RDTE/Aircraft-Eng/Manuf Develop	0.00%	0.00%	3.78%
AC22	RDTE/Missile and Space Systems-Applied Research	0.00%	0.00%	3.15%
AC23	RDTE/Missile and Space Systems-Adv Tech Dev	2.27%	0.57%	3.46%
AC25	RDTE/Missile and Space Systems-Eng/Manuf Devel	0.00%	0.00%	2.10%
AC53	RDTE/Weapons-Adv Tech Dev	0.00%	0.00%	2.17%
AC65	RDTE/Electronics & Communication Eq-Eng/Manuf Dev	0.00%	0.00%	1.85%
AD92	RDTE/Other Defense-Applied Research	0.90%	1.10%	1.50%
AD93	RDTE/Other Defense-Adv Tech Dev	0.00%	0.00%	1.09%
AR25	RDTE/Space-Science Applications-Eng/Manuf Devel	66.67%	69.86%	2.01%
AR55	RDTE/Sp & Terrestrial Application-Eng/Manuf Devel	0.00%	0.00%	1.54%
AZ13	RDTE/Other Research & Development-Adv Tech Dev	3.97%	0.13%	2.10%
AZ16	RDTE/Other Research & Development-Mgmt Support	25.68%	83.73%	1.13%
B599	Other Special Studies & Analyses	48.99%	27.82%	1.88%
H216	Equip & Mats Testing/Aircraft Comps & Accys	0.00%	0.00%	6.51%
J015	Maint & Repair of Eq/Aircraft Structural Comps	18.93%	26.04%	2.73%
J016	Maint & Repair of Eq/Aircraft Comps & Accys	6.32%	0.58%	1.41%
J070	Maint & Repair of Eq/ADP Equip & Supplies	5.42%	1.42%	1.92%
L014	Tech Rep Svcs/Guided Missiles	60.12%	70.47%	3.34%
R414	Systems Engineering Services	31.46%	26.10%	5.33%
R425	Engineering Technical Services	47.41%	35.04%	2.23%
R499	Other Professional Services	30.24%	72.94%	1.79%
S216	Facilities Operations Support Services	72.41%	77.31%	3.25%
V121	Air Charter for Things	99.78%	98.86%	6.00%
V221	Passenger Air Charter Service	64.66%	93.96%	3.88%
Totals:		27.66%	31.37%	66.15%

The service codes above represent 1% of the service dollars spent or greater, or $60M or greater, and provide a high level view of the data. When analyzing these results, we can see some common service codes, such as AZ16 (Other Research and Development Management Support) where the expenditure for this service is greater then $300M and greater then 80% for the USAF is being accomplished as PBSA. AFMC, for service AZ16, is greater then 90% for PBSA utilization. By viewing this data, we can find common points that are being greatly utilized, represent the greatest point of expenditure, and try to apply them to other services.

Similar to finding the strong points in the data, we can do the same for the weak points of the data. For example, R414 (Systems Engineering Services) which in both the AFMC and USAF represents 5% or more of service dollars spent, but this service is only utilized to approximately 25% of PBSA. Another example would be service code H216, Equipment and Maintenance Testing of Aircraft Components. H216 represents $1.7B, 6.5%, of the USAF budget for services, with none of the requirements utilized under PBSA. Key areas, such as these, need to be looked at in further depth in order to determine if they should be exempt from PBSA usage or if they need to be pursued in greater depth for PBSA utilization. It is through identification of these key areas, that the USAF will make its greatest strides in obtaining its goals.

The second key indicator, contract type, is summarized in Tables 8, 9, and 10.

Table 8. Summary of Contract Type for AFMC FY 2002

AFMC FY 02 Separated PBSA by Contract Type				
Contract Type	Contract Type Description	% of Actions Yes PBSA by Contract Type	% of Dollars Yes PBSA by Contract Type	% of Contract Type Dollars by Total Contract Type Dollars
A	Fixed Price Redetermination	33.33%	63.49%	0.02%
J	Firm Fixed Price	26.58%	34.30%	34.93%
K	Fixed Price Economic Price Adjustment	50.00%	74.58%	0.03%
L	Fixed Price incentive	13.33%	77.60%	4.28%
M	Fixed Price Award Fee	72.06%	57.63%	0.92%
R	Cost Plus Award Fee	47.20%	47.51%	21.12%
S	Cost Contract	16.39%	29.05%	1.04%
T	Cost Sharing	28.57%	19.09%	0.02%
U	Cost Plus Fixed Fee	9.37%	18.44%	10.86%
V	Cost Plus Incentive Fee	9.28%	2.49%	3.61%
Y	Time and Materials	28.01%	15.70%	21.14%
Z	Labor Hour	32.62%	29.65%	1.97%
Not Listed		18.18%	32.29%	0.05%
Totals:		25.58%	32.22%	100.00%

Table 9. Summary of Contract Type for AFMC FY 2003

AFMC FY 03 Separated PBSA by Contract Type				
Contract Type	Contract Type Description	% of Actions Yes PBSA by Contract Type	% of Dollars Yes PBSA by Contract Type	% of Contract Type Dollars by Total Contract Type Dollars
A	Fixed Price Redetermination	50.00%	15.84%	0.00%
J	Firm Fixed Price	20.30%	16.55%	32.20%
K	Fixed Price Economic Price Adjustment	83.33%	99.51%	0.03%
L	Fixed Price incentive	21.74%	37.36%	4.26%
M	Fixed Price Award Fee	38.89%	43.74%	0.74%
R	Cost Plus Award Fee	28.18%	28.49%	23.17%
S	Cost Contract	12.06%	5.16%	5.70%
T	Cost Sharing	7.27%	1.94%	0.13%
U	Cost Plus Fixed Fee	1.30%	3.40%	16.75%
V	Cost Plus Incentive Fee	38.16%	12.75%	3.54%
Y	Time and Materials	21.90%	16.11%	12.96%
Z	Labor Hour	22.57%	21.50%	0.49%
Not Listed		42.86%	83.07%	0.02%
Totals:		14.64%	17.40%	100.00%

Table 10. Summary of Contract Type for USAF FY 2003

USAF FY 03 Separated PBSA by Contract Type				
Contract Type	Contract Type Description	% of Actions Yes PBSA by Contract Type	% of Dollars Yes PBSA by Contract Type	% of Contract Type Dollars by Total Contract Type Dollars
A	Fixed Price Redetermination	33.33%	2.10%	0.02%
J	Firm Fixed Price	36.37%	44.14%	37.69%
K	Fixed Price Economic Price Adjustment	84.03%	82.07%	0.30%
L	Fixed Price incentive	32.74%	42.95%	3.80%
M	Fixed Price Award Fee	58.30%	68.23%	1.06%
R	Cost Plus Award Fee	39.98%	31.24%	28.69%
S	Cost Contract	12.11%	5.88%	3.83%
T	Cost Sharing	7.27%	1.94%	0.08%
U	Cost Plus Fixed Fee	3.45%	6.00%	11.17%
V	Cost Plus Incentive Fee	48.92%	13.48%	4.91%
Y	Time and Materials	24.27%	18.43%	8.01%
Z	Labor Hour	27.60%	32.78%	0.35%
Not Listed		10.20%	20.19%	0.09%
Totals:		27.66%	31.37%	100.00%

Like that of service codes, we can identify key areas by contract type that utilize the most expenditure for services. Looking at Tables 8, 9, and 10, we can identify four different contract types with the highest expenditures for total service acquisitions: J (Firm Fixed Price (FFP)), R (Cost Plus Award Fee), U (Cost Plus Fixed Fee), and Y (Time and Materials). Of particular interest and specifically pointed out as being utilized for PBSA is the FFP contract type. In FY 2003, the USAF utilized 44% of FFP as PBSA and AFMC utilized even lower. These four categories represent 85% of the dollars spent on services. It is areas such as these that improvement can be obtained in order to reach established PBSA requirements.

The final area within demographics that the research will touch upon is that of service actions/dollars spent for services against that of business size. Tables 11, 12, and 13 represent a summary of these findings.

Table 11. Summary of Business Size for AFMC FY 2002

AFMC FY 02 Separated PBSA by Business Size				
Business Size	Business Size Description	% of Actions Yes PBSA by Business Size	% of Dollars Yes PBSA by Business Size	% of Business Size Dollars by Total Business Size Dollars
A	Small Disadvantaged Business (SDB) Performing in the US	36.36%	36.81%	5.61%
B	Other Small Business	29.75%	36.48%	8.88%
C	Large Business Performing in the US	21.13%	32.25%	80.43%
D	JWOD Participating Nonprofit Agency	47.83%	60.28%	0.38%
F	Hospital	100.00%	100.00%	0.01%
L	Foreign Concern or Entity	13.95%	10.24%	0.26%
M	Domestic Firm Performing Outside the US	24.62%	10.27%	2.51%
T	Historical Black College or University (HBCU)	0.00%	0.00%	0.00%
U	Minority Institution (MI)	0.00%	0.00%	0.00%
V	Other Educational	24.66%	39.73%	0.71%
Z	Other Nonprofit	40.35%	14.71%	1.22%
Not Listed		0.00%	0.00%	0.00%
Totals:		25.58%	32.22%	100.00%

Table 12. Summary of Business Size for AFMC FY 2003

AFMC FY 03 Separated PBSA by Business Size				
Business Size	Business Size Description	% of Actions Yes PBSA by Business Size	% of Dollars Yes PBSA by Business Size	% of Business Size Dollars by Total Business Size Dollars
A	Small Disadvantaged Business (SDB) Performing in the US	30.45%	34.37%	3.40%
B	Other Small Business	13.17%	20.02%	8.35%
C	Large Business Performing in the US	12.96%	17.57%	78.58%
D	JWOD Participating Nonprofit Agency	67.74%	72.39%	0.22%
F	Hospital	0.00%	0.00%	0.00%
L	Foreign Concern or Entity	16.84%	9.43%	0.36%
M	Domestic Firm Performing Outside the US	8.94%	9.50%	2.50%
T	Historical Black College or University (HBCU)	0.00%	0.00%	0.04%
U	Minority Institution (MI)	0.00%	0.00%	0.15%
V	Other Educational	8.55%	4.87%	4.50%
Z	Other Nonprofit	16.23%	4.99%	1.89%
Not Listed		42.86%	83.07%	0.02%
Totals:		14.64%	17.40%	100.00%

Table 13. Summary of Business Size for USAF FY 2003

USAF FY 03 Separated PBSA by Business Size				
Business Size	Business Size Description	% of Actions Yes PBSA by Business Size	% of Dollars Yes PBSA by Business Size	% of Business Size Dollars by Total Business Size Dollars
A	Small Disadvantaged Business (SDB) Performing in the US	35.08%	49.27%	4.39%
B	Other Small Business	23.31%	31.90%	7.42%
C	Large Business Performing in the US	26.33%	28.62%	74.70%
D	JWOD Participating Nonprofit Agency	68.69%	60.65%	0.68%
F	Hospital	0.00%	0.00%	0.00%
L	Foreign Concern or Entity	46.88%	42.88%	1.51%
M	Domestic Firm Performing Outside the US	45.22%	58.34%	4.63%
T	Historical Black College or University (HBCU)	4.17%	3.49%	0.03%
U	Minority Institution (MI)	7.27%	1.40%	0.09%
V	Other Educational	7.94%	5.58%	2.83%
Z	Other Nonprofit	14.73%	41.93%	3.62%
Not Listed		10.20%	20.19%	0.09%
Totals:		27.66%	31.37%	100.00%

Unlike previous key indicators, business size breaks down to almost one key element, large business (code C above) holds the predominance of the business for the USAF in services. Based on the data, 75% of the dollars spent of services goes to large business, yet only 28.6% of those dollars were awarded towards PBSA. In order for any improvement to occur, the USAF must rely on business practices that come from the commercial community and large business represents a great portion of this industry (Moore et.al., 2002). If we look at industries best practices, there is a possibility to determine how the commercial sector is approaching services, convert additional dollars and actions to PBSA (Moore et.al., 2002). Now that demographics has identified three key indicators within PBSA, nominal logistical regression will identify any predictive relationships with the data.

Nominal Logistical Regression. As stated in Chapter 3, nominal logistical regression utilized nominal data or data that is verbal in nature and can be converted into a numerical value. The results from these tests were inconclusive. The highest R^2 that could be found using a single independent variable was that of .1. This means that none of the data when looked at individually against the dependent variable of PBSA, produced a very low explanatory for the prediction of whether a contract would be PBSA or not (McClave et.al., 2001). It is important to note that many of the variables used, including that of service codes, were classified as unstable, meaning that a regression model could not be established. When multiple independent variables were utilized, including contract type and business size, the greatest R^2 that could be achieved was .145 and required 13.5% of the data to be removed in order the model to have any predictive

capability. The justification for removing data points is based on data that was either unduly influential on the model or was considered a major outlier with regards to the rest of the data (McClave et.al., 2001). Table 14 summarizes the results against the dependant variable, PBSA.

Table 14. Summary of Nominal Logistical Regression

Variable	R^2 (U)	Prob>ChiSq
B8, Dollars	0.0000	0.4533
B9, Foreign Military Sales	0.0010	<.0001
B13A, Contract or Order	0.0041	<.0001
B13B, Type if ID Contract	0.0082	<.0001
B13C Single or Multiple Award ID Contract	0.0019	<.0001
B13D, Modification	0.0165	<.0001
B15, IT Product or Service	0.0760	<.0001
C1, Synopsis	0.0012	<.0001
C3, Extent Competed	0.0154	<.0001
C5, Type of Contract	0.1003	0.0000
C14, Commercial Item	0.0295	<.0001
C5, Type of Contract; C14, Commercial Item; D1A, Type of Entity	0.1454	0.0000

Contingency Tables. Despite the apparent failure of the nominal logistical regression, contingency tables identified a different point of view when looking at key variables within a contract. Contingency tables were run on all variables that were considered stable during nominal logistical regression. Since this was a secondary step in determining correlations between variables, all unstable variables were considered to have little value in the process and the focus remained on those variables that showed some predictive value to the dependent variable. The only exceptions to this were the

contingency tables for service code and business size. Despite their unstable results in nominal logistical regression, these two variables has been identified as key elements within PBSA. The results that will be obtained from using these two variables, provides additional value to the process in determining if they are truly key elements. A summarized listing of results for independent variables against the dependent variable PBSA, can be seen in Table 15.

Table 15. Summary of Contingency Tables

Independent Variable	χ^2	χ^2_α	Degrees of Freedom (df)	Result
B12A, Service Code	7864.938	132.157	103	Dependent
B13A Contract	93.893	12.5916	6	Dependent
B13B Type ID Contract	150.697	5.99147	2	Dependent
B13C Multi or Single ID Contract	28.153	3.84146	1	Dependent
B13D Modification	282.445	12.5916	6	Dependent
B15 IT Products or Service	453.387	11.0705	5	Dependent
C1 Synopsis	29.693	5.99147	2	Dependent
C3 Extent Competed	457.758	7.81473	3	Dependent
C5 Type of Contract	2017.582	16.9190	9	Dependent
C8 Solicitation	936.568	12.5916	6	Dependent
C10 Labor Standards	2243.456	7.81473	3	Dependent
C14 Commercial Item	871.347	3.84146	1	Dependent
D1A Type of Entity (Small, DSB, Large, etc.)	677.967	15.5073	8	Dependent

The contingency table of B12A (Service Code) required the removal of 15% of the data and narrowed the number of service codes utilized down to 104. The justification for removing the data, as explained in Chapter 3, is that once the information is tabulated, data cells that have an expected value of 5 or less must be removed, as they will cause inconsistencies within the table, due to the low expected number (McClave et.al., 2001). With the remaining service codes, it was determined that dependence between the two variables, service codes and whether a contract is PBSA or not, does exist. This tells us that if we know one of the 104 service codes, we have some insight as to PBSA. The extent of this dependency is not known from this table; this would have to be identified through regression, but simple that it does exist. It goes to reason, that if we know a contract will have that particular service code, we will have some idea as to whether an action is PBSA or not. It is important to know that a relationship does exist between the variables and that the events are connected, but there can be possible issues in the way of anomalies in the data that must be addressed. (McClave et.al., 2001)

When looking at the contingency table for B12A, service codes, it becomes apparent that in some of the cells, such as AC12 (Applied Research for Aircraft), there is an actual count of 0, with an expected count of much greater value. Contingency tables will calculate all cells in the same fashion, with expected counts of 5 or greater for all cells in the table. We know from research, that research and development has historically not been utilized under PBSA (FAR Part 35). This explains why the actual count is zero and yet there is an expected count in the cell. Additional anomalies, such as those with higher actual counts then those of expected, such as AZ16 (Research and Development Management Support), are also expected. Like that of cells with lower actual counts then

expected ones, higher actual counts contend with the same issue in reverse. Based on contingency table cell formulas and that we know 90% of the AZ16 service is utilized under PBSA, it is anticipated that this actual count will be higher then the expected count displayed. (McClave et.al., 2001)

The next batch of codes that were looked at included the B13 (Kind of Action) series: B13A (Contract or Order), B13B (Type of Independent Delivery Contract), B13C (Multi or Single Independent Delivery Contract), and B13D (Modification). All four variables showed dependence against PBSA. This result is again expected despite the results from nominal logistical regression. If we know whether the action being taken is a contract or order against an existing contract, then we would have an insight as to whether an item is PBSA. Modification and type of modification is slightly different in that if we know that a contract or order is already PBSA or not, that the modification is coded in the same respect and would naturally have dependence on the predecessor work.

When looking at the variable B15 (Information Technology Product or Service) it becomes vary apparent that two codes, those listing commercial or non-commercial service, are the primary drivers establishing dependence. This will coincide with the dependence found in C14 (Commercial Item) and whether an item is commercial, yes or no. The next two table C1 (Synopsis) and C3 (Extent Competed) both show dependency and if we know this information, like before, can give us insight to PBSA.

C5 (Contract Type) is one of the few variables that exhibited signs during nominal logistic regression to have some glimmer of hope as to having a predictive capability. If we know the contract type, we should have a reasonable idea to that of a contract action being PBSA or not. We know from demographics that FFP type contracts

exhibit 44% of the USAF's contract actions to be PBSA. However, there was an anomaly identified for type U, Cost Plus Fixed Fee (CPFF), contracts with a lower actual then expected count. CPFF is typically used for research and development and since we know from the past that many of these type efforts were not awarded under PBSA, it goes to reason that the type of contract used in this area would follow suit.

The next two tables, C8 (Solicitation Procedures) and C10 (Labor Standards) are typically more products of previous factors. In other words, if we know what type of contract type we are going to use, if know what type of service code it will fall under, then these are drivers as to what solicitation procedures we will use and what labor standards will be required. That being stated, it goes to reason that we can show dependency with PBSA, through the use of other criteria.

The final table the research will look at is D1A (Type of Entity or Business Size). Like that of B12A (Service Code), it was found to be unstable under nominal logistical regression, but merited further analysis due to its potential weight on PBSA. Despite its previous unstable condition, no data was required to be removed in order to conduct this contingency table and it was determined that there exists dependency between a contractor's size and that of PBSA. As previously noted through demographics, we know that the bulk of awards are done through large business. However, we can see a predictive value across all business concerns with no anomalies noted. Thus, we know that a relationship does exit between these two variables.

Summary

This chapter provided a discussion of the data results that were obtained. By taking a combination of the three analysis tools used, an insight can be provided as to whether PBSA will be utilized and typically where it has been used in the past. Areas have been identified, through demographics, that are being greatly or underutilized and to what extent each play in the overall expenditure of PBSA. Nominal logistical regression did not produce any dependencies, but dependency among variables was determined through the use of contingency tables. Chapter 5 will discuss conclusions from these results, limitations to research, and possible future research that can be conducted.

V. Conclusions and Recommendations

The purpose of this research was to provide an exploratory study within Performance Based Service Acquisition (PBSA), in which future research can be based. In order to accomplish this task, the following research question was developed: What is the status of PBSA implementation in the US Air Force (USAF)? The following investigative questions were developed in order to answer the research question:

1. Are the goals, as established by Dr. Gansler and National Defense Authorization Act (NDAA), being met by Air Force Material Command (AFMC) and the US Air Force (USAF) and are there any trends to suggest future usage of PBSA?

2. What factors, if any, are related to whether a contract is classified as having been awarded using PBSA strategies?

This chapter will address this research effort's conclusions, benefits, limitations, and provide suggestions for future research.

Conclusions

Part one of investigative question 1, has the USAF met PBSA goals, has been answered and found to be **YES**; the USAF is meeting NDAA FY 2002 requirements of 25% of service actions and dollars for FY 2003 (NDAA, 2002). While the NDAA goals are at the service level, based on the research found, AFMC is not meeting the intent set by the NDAA, given the two-year potential trend in data. Also, the data is unlikely to

make the following year requirement of 35% of service actions and dollars (NDAA, 2002).

Part two of investigative question 1, are there any trends, has some potentially troubling news. If AFMC continues with its rate of PBSA usage, again based on two years of data analyzed, the USAF will find it difficult to make the FY 2004 NDAA requirement. Since the requirements by Dr. Gansler and the NDAA are to reach 50% by FY 2005, it is unlikely the remainder of the USAF, outside of AFMC, will be able to reach or maintain higher levels then they are already at, which is already close to 50% for actions and slightly above 50% for dollars (Gansler, 2000; NDAA, 2002). Even if the organizations outside of AFMC do obtain higher rates, the predominant amount of service actions and dollars, approximately 60%, reside within AFMC and the onus will be on that command to ensure that the requirements for PBSA are being met.

Additional trends that have been identified through demographics can be utilized to help focus efforts for future usage. It is this researcher's opinion that key types of services should be focused upon in order to gain the optimal amount of benefit for both AFMC and USAF. This would include all services that have been indicated as greater then 1% of the dollars spent for services. By focusing on key types of contracts, such as Firm Fixed Price (FFP), greater efforts can be placed in order to improve their usage within PBSA. FFP is one of the primary contract types for utilizing PBSA and yet the USAF is only at 44% for FFP. In the cost type contract arena, specifications can be looked at in order to see if contract type can be changed and support PBSA. In addition to focusing on the four indicated contract types identified in chapter 4, focusing on large

business concerns should also help to gain the greatest benefits for trying to achieve established goals.

Investigative question 2 asked if there were any discernable correlations between whether a contract is awarded PBSA based on criteria such as type of service, dollar amount, length of contract, business size, and contract type. It is unfortunate that nominal logistical regression was unable to determine any usable correlations or patterns within the data, in order to develop a predictive model. It was the hope of this researcher to build a model in were if certain characteristics were known, a reasonable prediction as to whether a contract action would be PBSA or not could be determined. Through this effort, characteristics that would identify more with a No response to PBSA could be analyzed further and efforts placed in those areas.

Despite the lack of insight provided by nominal logistical regression, contingency tables provided a different perspective. Through contingency tables, this researcher identified dependency between 14 different variables or sections within a contract action. By identifying these dependencies, we gain further understanding as to what factors affect PBSA utilization. The primary purpose of these tables was to determine if dependence existed, nothing more. This tells us that a casual relationship may exist, but not to what extent the dependency is. By definition, if the two factors are dependent, the occurrence of one altars the probability of the other (McClave et.al., 2001).

In order to best utilize this information, individuals focused on using PBSA to its greatest extent, should look for these common factors. If these factors exist within a contract action and it is not identified as PBSA, then there exists the possibility for change. Since nominal logistical regression is inconclusive, but contingency tables

identified dependency, by understanding the two we can focus further research efforts or focus our ability to use these individual or combined factors in order to ensure greater usage of PBSA.

Study Limitations

Certainly there are always ways that researchers could have done something better throughout their work and this project is no exception. This researcher, based on time constraints, settled for the data that was provided and available at the given time. If more time had been available, additional data for AFMC and USAF could have been gathered for more years and utilized to provide an added in-depth look.

Based on this lack of data across multiple years, the results of this data are skewed as to the two-year potential trends that could be developed across AFMC and comparisons between AFMC and USAF for one year. Multiple years of data could have provided a different insight as to possible cyclical patterns or possible predictive models that could have been developed. This correlates to the results only being as strong as the data provided and could have a different outcome if the data had been greater.

A possible second limitation to this research is the approach that was used by the researcher. Since very little research has been done in this arena, it was the determination of this researcher to perform a more exploratory study as a building block for further research to be conducted. The data suggests that this type of research is not the most compatible and difficult to achieve. If the research had been approached more as a case study or as a survey, it is possible that findings would have come to different conclusions and gone in a different direction then this research.

Future Research

There are several possible areas that can be utilized for future research following this effort. This first, and most obvious one, is that additional data across multiple years needs to be gathered. From this, a greater analysis regarding trends, predictive models, etc., can hopefully be built and a greater insight into the world of PBSA, beyond this researcher's efforts, obtained.

A second possible research area, briefly touched upon in chapter 2, is that of training. Previous research from the RAND Corporation's Project AIR FORCE, identified specific areas that needed to be looked at when viewing PBSA, one of which included training (Ausink et.al., 2001). There is additional literature available that supports the need for training within PBSA, but does not develop the extent required and no research has been discovered that has investigated this region of PBSA. This area has possible merit for future research within this field.

It has been mentioned various times that the USAF should apply commercial industries' best practices to PBSA (Ausink et.al., 2001; Gansler, 2001; Moore et.al., 2002; OFPP, 1994). However, this researcher found no clear cut or established criteria as to what these commercial best practices are. It is understood that best practices will change in time, but what are the current best practices and are they being utilized. It would be of some value if a snap shot of what industry considers its best practices were determined and then compared to the USAF, in order to determine if these best practices are being gathered.

The final area to recommend for research involves the commercial sector. It was referenced toward the end of chapter 2 that industry only utilizes PBSA between 5-20% of its services acquisition efforts (Barry, 2003). It would be of interest if this was examined further and a determination made as to the true extent of PBSA usage within industry. Based on these findings, a comparison could then be accomplished against the USAF and DoD. Additionally, the requirements that are set forth for PBSA could be reviewed and based on comparison, a determination made as to whether they are reasonable or not. Final conclusions could then be drawn as to whether the DOD and USAF are heading down the appropriate road or these requirements need to be re-evaluated at the service secretary level.

Conclusion

This chapter provided a brief summary of this research effort and conclusions that could be drawn from this research. Areas addressed included the benefits of this research, the research's limitations, and suggestions for future research.

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14. ABSTRACT

Federal procurement has typically focused much of its efforts on the acquisition of products, with acquisition of services not being held in as high of regard. However, recent changes have required the Department of Defense and the US Air Force (USAF) to increase spending on services. This significant increase in spending on services suggests a need to ensure acquisition professionals are prepared to apply sound business judgment to Performance Based Service Acquisition (PBSA) strategies. PBSA involves acquisition strategies, methods, and techniques that describe and communicate measurable outcomes rather than direct performance processes. The Secretary of Defense, in order to ensure the success of PBSA, has established a goal of 50% of all service acquisitions meet PBSA requirements by 2005.

This thesis looks the current status of PBSA with the USAF, if goals are being met, are there any trends to suggest future usage of PBSA, and what factors, if any, are related to whether a contract is classified as having been awarded using PBSA strategies. A combination of demographics, nominal logistical regression, and contingency tables will used in order to determine if the USAF is in compliance and if there are correlations within PBSA that affect its use. The results of this thesis will serve as a starting point from which further research can develop and provide information that can help utilize PBSA in the future.

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